CI-1 and CI-8

Communications Interface

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LIMITED WARRANTY

WSE warrants to the original user the Equipment manufactured by WSE as described herein (the Equipment) to be free from defects in material and workmanship for a period of one year from the date of purchase by such user or fifteen (15) months from the date of shipment from the factory, whichever is sooner, provided:

    I   WSE has been notified within such period by return of any alleged defective equipment, free and clear of any liens and encumbrances to WSE or its authorized Dealer at the address specified, transportation prepaid; and

    II   the Equipment has not been abused, misused or improperly maintained and/or repaired during such period; and

    III   such defect has not been caused by ordinary wear and tear; and

    IV   such defect is not a result of voltage surges/brownouts, lightning, water damage/flooding, fire, explosion, earthquakes, tornadoes, acts of aggression/war or similar phenomena; and

    V   accessories used as integral to WSE Systems have been approved by WSE (e.g., coaxial cables, batteries, etc.); and

    VI   the Equipment has been installed, the installation supervised or installation tested by an authorized WSE Dealer.

WSE's Analog Proximity Command Keys are warranted for 5 years. WSE shall at its option, either repair or replace, free of charge, the Equipment found, upon WSE's inspection to be so defective, or if agreed upon, refund the purchase price, less a reasonable allowance for depreciation, in exchange for the Equipment.

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FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the installation manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Only peripherals, included shielded cables, certified to comply with the Class A limits may be attached to this computer. Changes or modifications not expressly approved by WSE could void the user's authority to operate the equipment. Some components may comply with Class B rules, and if so will be so marked.

If necessary, consult the dealer or an experienced radio/television technician for additional suggestions. The user may find helpful the following booklet prepared by the Federal Communications Commission: *How to Identify and Resolve Radio/TV Interference Problems*. The booklet is available from the US Government Printing Office (stock number: 004-000-00345-4).

Contents

SECTION 1: CI-1 SINGLE COMMUNICATIONS INTERFACE

DESCRIPTION

The CI-1 can be used to connect up to four ACUs to a single host computer and to extend the distance between an ACU and host computer to 2000 ft (610 m) A block diagram of a typical CI-1 installation is shown in Figure 1-1. The CI-1 is designed to operate only with WSE access control equipment, and only as described herein. For other applications, contact WSE Customer Support.
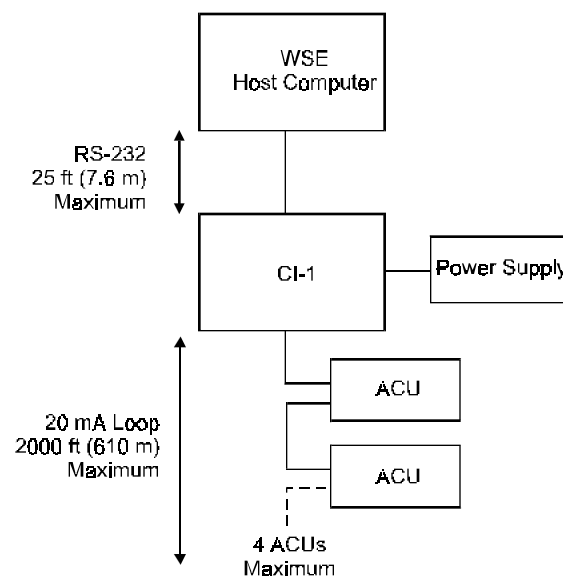

Figure 1-1: CI-1 Installation Block Diagram

ACUs connected to a host through the CI-1 may be any combination of WSE NexSentry, Alto 818 and SE 808 devices using 20 mA loop communication. The CI-1 to host connection uses RS-232 communication over a maximum distance of 25 feet (7.6 meters). The CI-1 to host communication may be at a baud rate of up to 9600. Figure 1-2 shows the front of a CI-1.
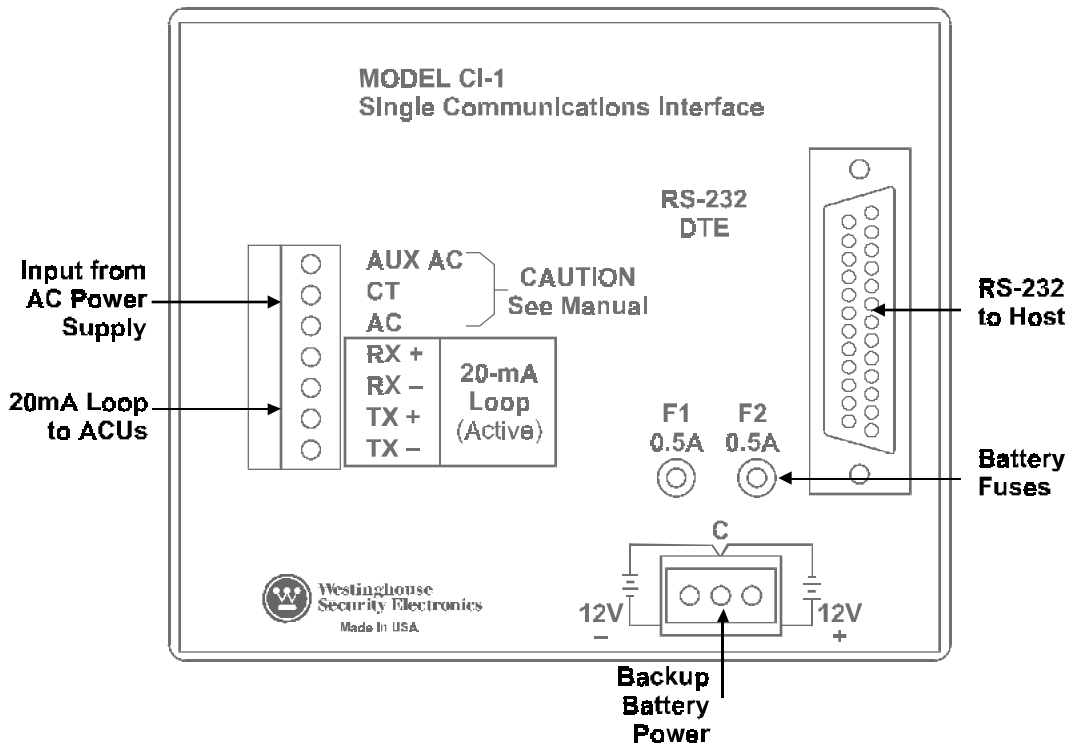
Figure 1-2: CI-1 Communications Interface

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Housing Dimensions	4in X 5in X 2in (10.16cm X 12.70cm X 5.08cm)
Operating Temperature	32°– 120°F (0°– 50°C)
Humidity	0 to 95% non-condensing
Fuses	Two .5-amp fuses for battery input, F1 and F2.
RS-232 DTE Port	25-pin RS-232 connection to host computer system.
Power Input	Connection to power supply or AC transformer. Terminals labeled AUX AC, CT and AC; 18 VAC, 80 mA nominal.
Battery Backup Input	Connection to backup battery; two 12-volt batteries rated at 2 to 6 amp-hours. Terminals labeled12V-, C and 12V+.
20mA Loop Connector	Four-terminal port for connection to ACUs. Terminals labeled RX+, RX-, TX+ and TX-. Use unshielded, dual, twisted pair wire, minimum 24 AWG.

POWER

The CI-1 requires a power supply which can provide 18VAC, 80mA, nominal. The SE 3018S Power Module, SE 3718SU Uninterruptible Power Supply or an AC transformer may be used. Connections are shown in Figure 1-3.
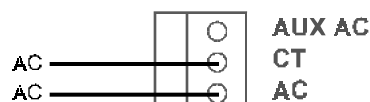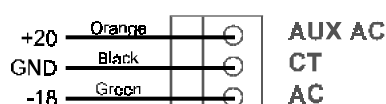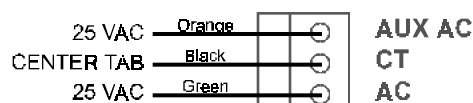

Figure 1-3: Primary Power Connections

If the SE 3018S Power Module is to be used, battery backup power is suggested. Two 12V batteries rated for 2 to 6 amp-hours are recommended. A three-pin connector on the CI-1 is provided to connect the batteries; see Figure 1-4. Battery inputs are fused. Check the battery fuses regularly; replace with a ½-amp fuse as required.
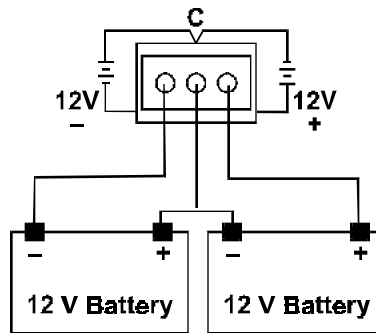
Figure 1-4: Backup Battery Connection

NOTE:

The CI-1 does not charge the two 12VDC batteries; use an external battery charger. The charge level must be checked periodically to assure proper power levels.

Follow the below procedure to connect batteries to the CI-1. Connecting the batteries incorrectly will blow one or both fuses on the CI-1.

1. Connect the first battery's negative terminal to the -12 V terminal of the CI-1, and connect the battery's positive terminal to the common (C) terminal.

2. Connect the second battery's negative terminal to the CI-1 common (C) terminal, and connect the battery's positive terminal to the +12 V terminal of the CI-1.

COMMUNICATION

The CI-1 connects to the ACUs via the 20 mA terminals. Four-wire, dual twisted-pair, 24-gauge (minimum), unshielded wire is required. Four wires in a single twisted configuration may *not* be used. The maximum cable length is 2000 ft, to a maximum of four ACUs when no RF interference is present.   The actual cable length and number of ACUs supported will be impacted by environmental conditions

The ACU cable supplied with the host or a standard null-modem cable may be used to connect the CI-1 and host. Figure 1-5 shows the minimum wire connections between the CI-1 and host.
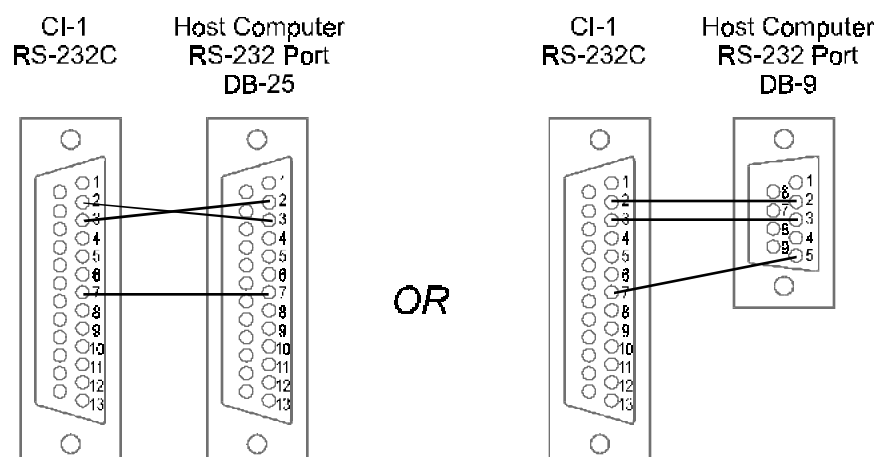
Figure 1-5: CI-1 to Host System Connection

The following general rules apply to all communication cables:

1. Plastic cable clamps and tie-wraps are acceptable. Staples must never be used to secure communication cables.

2. Communication cables from the CI-1 ports may be bundled together and may share a common conduit run; however, bundling or sharing conduit runs with cables of other electrical or electronic devices must be avoided. Bundling should be loose, and conduit sizes should be as required by the electrical codes.

3. Avoid splicing communication cables. If splicing is unavoidable, maintain as much 'twist' as possible in the twisted pairs. Protect the splice with shrink tubing to avoid shorts and ground faults.
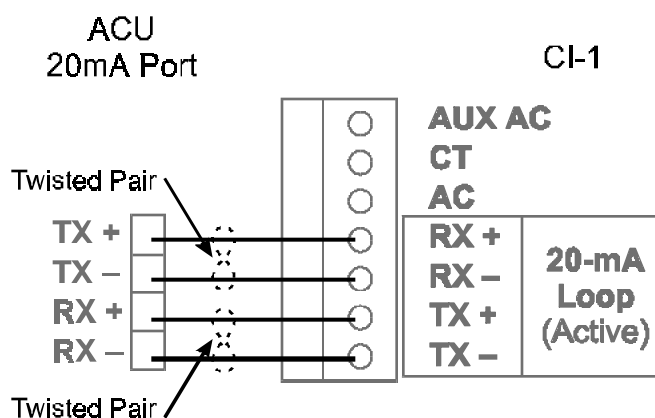

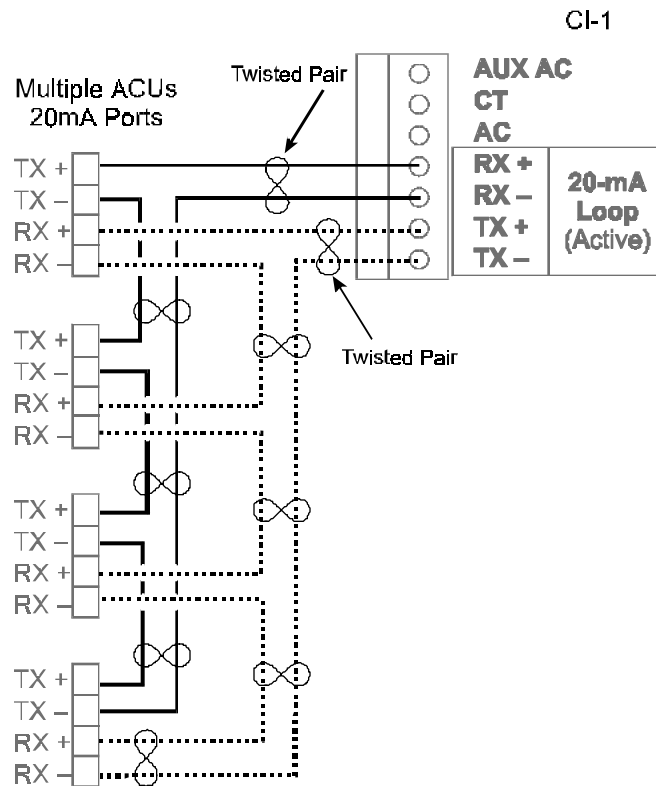**Figure 1-6: CI-1 to Single ACU Connection**

Figure 1-7: CI-1 to Multiple ACUs

NOTE:

If the 20mA loop includes SE 818 or NexSentry ACUs, each must be powered on for any communication with the host. Communication is not lost when an SE 808 is powered off.

MOUNTING

The CI-1 should be installed in an electrical equipment cabinet such as the NEMA Type 1 panel enclosure. Often, it is convenient to mount the CI-1 in the same cabinet as the ACUs and power module. Double-sided foam tape on the back of the case of the CI-1 permits mounting on most surfaces. A cabinet should provide:

1.   Wiring clearance of 6 in (15 cm) around the edges of each unit.

2.   Service clearance of approximately 8 in (20 cm) at the front of each unit.

3. Adequate ventilation to remain within the operating temperature and humidity specifications.

Careful site selection is essential prior to installation. Ensure that your site meets all the following requirements:

1. Within 2000 ft of each ACU (distance measured in cable length).

2. Within 25 ft of the RS-232 host interface.

3. A minimum of 6 ft (2 m) from high voltage or high power equipment.

4. A minimum of 3 ft (1 m) from telephone cabling or equipment.

5. Free from all corrosive fumes and vapors. (Backup batteries should not be stored in the same cabinet as the ACU and power supply.)

TROUBLESHOOTING

This section provides troubleshooting procedures for CI-1 installations.

POOR OR NO COMMUNICATION

If there is poor or no communication between the host system and the ACUs, do the following:

1. Check connections from the CI-1 to the power supply.

2. Measure the voltage between the CT and AC terminals on the CI-1. It should be between 16 and 20 V; if it is not, replace the transformer or power supply. (The 3708 supplies 400 Hz, square wave power which may not be read correctly by some voltmeters.)

3. Check that the host computer and ACUs are set to the same baud rates. Check the port assignment on the host. See the appropriate user's manual.

4. Make sure that a null modem cable is used between the host system and the CI-1.

5. Check all fuses. Replace as necessary.

2. Check that the correct wire type has been used for the 20mA loop connections. Check for correct wiring; TX- and TX+ should use one twisted pair, RX- and RX+ should use the other twisted pair. See Figures 1-6 and 1-7.

LOOPBACK TEST

Using a known good cable between the host and the CI-1, jumper TX+ to RX-. With the host operating in the terminal mode, type ABC. The character string ABC should loop back and be displayed on the screen if the CI-1 is operating correctly. If this test fails, contact WSE Customer Support.

POWER SUPPLY AND BATTERY

Table 1-1 lists symptoms of power supply or battery problems and suggests diagnostic actions.

Table 1: Model CI-1 Troubleshooting

Symptom	Action
Works with battery but not with AC	Check transformer
Works with AC but not with battery	Check fuses
	Check battery voltages. Each battery should provide a minimum of 12V
Blows fuses; works with AC	Check battery connections
	Check battery voltages are less than 13.5V

SECTION 2: CI-8 MULTIPLE COMMUNICATIONS INTERFACE

DESCRIPTION

The CI-8 is an RS-232C data broadcast box which can be used to increase the number of ACUs connected to a single host computer and to extend the distance between an ACU and host computer. The CI-8 is data transparent and can operate at any baud rate up to 9600.

When ACU connection to the CI-8 is through the RS-232 ports, a maximum of eight ACUs may be used. The maximum distance between any ACU and the CI-8 is 25 ft (7.6 m) for RS-232 communication. When the 20mA loop ports are used, four ACUs may be connected to each of the eight ports for a maximum of 32 ACUs. The maximum distance between any ACU and the CI-8 is 2000 ft (610 m) for 20mA communication. Figure 2-1 provides a block diagram of a CI-8 installation using two RS-232 ports and two 20mA loop ports.
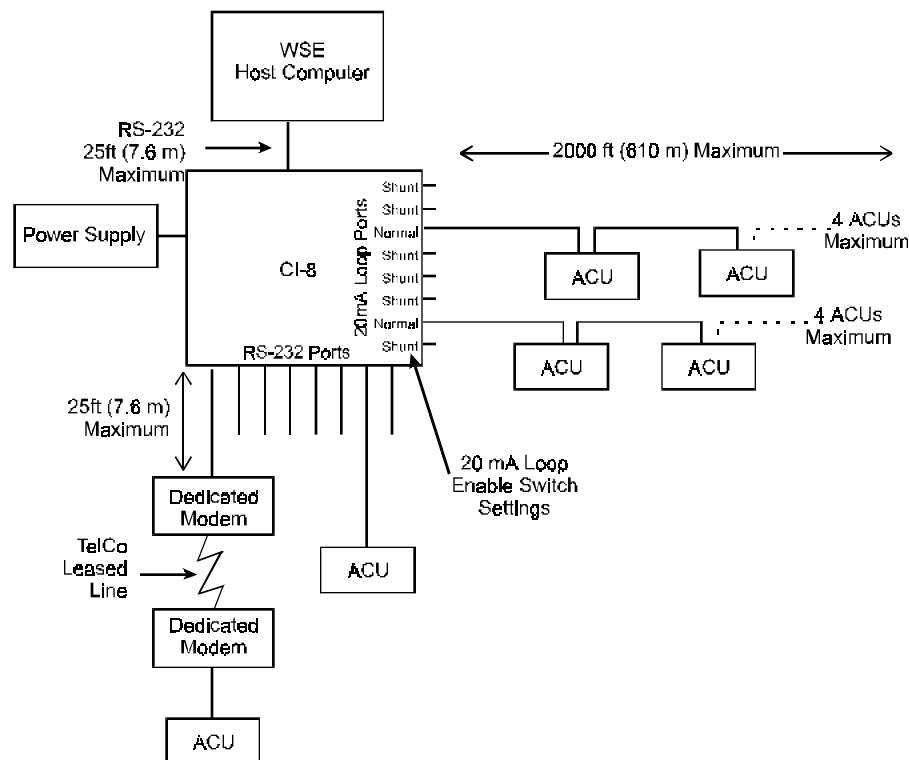

Figure 2-1: CI-8 Installation Block Diagram

The CI-8 is designed to operate only with WSE access control equipment, and only as described herein. For other applications, contact WSE Customer Support.

CI-8 features and specifications are listed below.

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Housing Dimensions	6.76in X 10.88in X 1.55in (17.17cm X 27.64cm X 3.94cm).
Operating Temperature	32°– 120°F (0°– 50°C).
Humidity	0 to 95% non-condensing.
Fuses	Two 1-amp fuses for battery input, F1 and F2.
Primary RS-232C DTE Port	25-pin RS-232 connection to host computer system. DB-25 connector.
RS-232C Port	Eight 25-pin RS-232 ports for connection to ACUs. DB-25 connectors.
Power Input	Connection to power supply or AC transformer and backup battery. Terminals labeled AUX AC, CT, AC, BATT-, COMM and BATT+. 6-pin Phoenix connector. Nominal AC input power is 18 VAC, 750 mA.; Two backup batteries should be 12 VDC rated at 20 amp-hours
20mA Loop Ports	Eight ports for connection to ACUs. Terminals labeled RX+, RX-, TX+ and TX-. Eight 4-pin Phoenix connector. Use unshielded, dual, twisted pair wire, minimum 24 AWG
20mA Loop Enable Switches	Eight switches corresponding to the eight 20mA loop ports. Set to Shunted for unused 20mA ports.
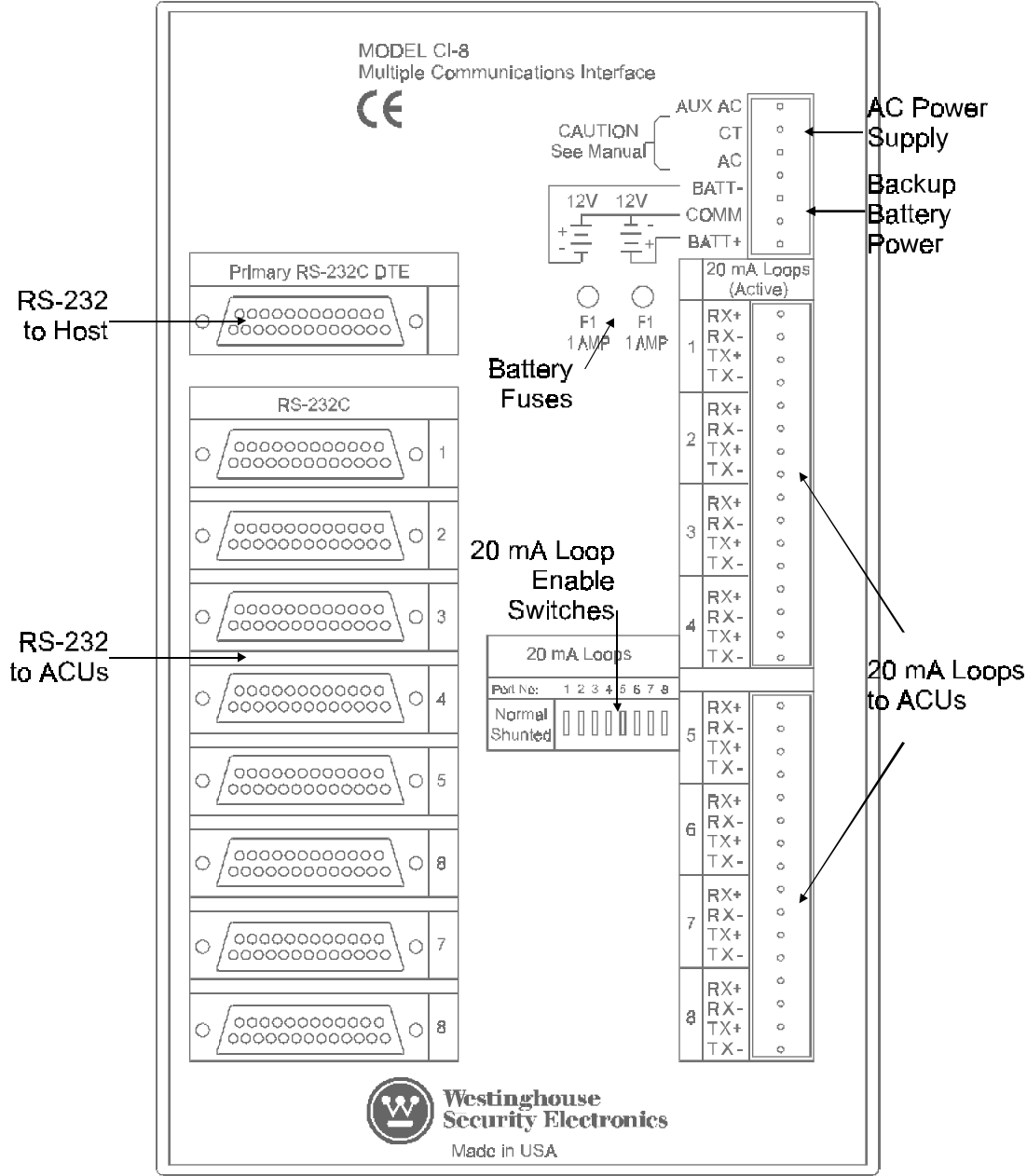
Figure 2-2: CI-8 Unit

MOUNTING

Double-sided foam tape is provided with the CI-8. When applied to the back of the unit, the tape permits mounting on almost any surface.

The unit should be installed in an electrical equipment cabinet, such as the NEMA Type 1 Panel Enclosure, which is designed to house electrical and electronic controls that do not require an oil- or dust-tight atmosphere. Is may be convenient to mount the CI-8 in the same cabinet as the ACUs. The cabinet should provide:

1. Wiring clearance of 6 in (15 cm) around the edges of each unit.

2. Service clearance of approximately 8 in (20 cm) at the front of each unit.

3. Adequate ventilation to meet operating temperature and humidity specifications.

When selecting an installation location, ensure that the following requirements are met:

1. Within 2000 ft of each ACU (distance measured in cable length).

2. Within 25 ft of the RS-232C host interface

3. Minimum of 6 ft (2 m) from high voltage or high power equipment.

4. Minimum of 3 ft (1 m) from telephone cabling or equipment.

5. Free from all corrosive fumes and vapors.

6.   CI-8 backup batteries should not be installed in the same cabinet as the ACU or power supply.

POWER

The CI-8 requires a power source which can provide a nominal 18 VAC, 750 mA, 13.5 WVA, minimum. This can be provided by the WSE 3718S Uninterruptible Power Supply, WSE 3018S Power Module or a transformer. Connections are shown in Figure 2-3.

If power is supplied by a transformer or 3018S Power Module, two 12V batteries are recommended as a backup in the event of a power loss. The batteries should be rated for 20 amp-hours.
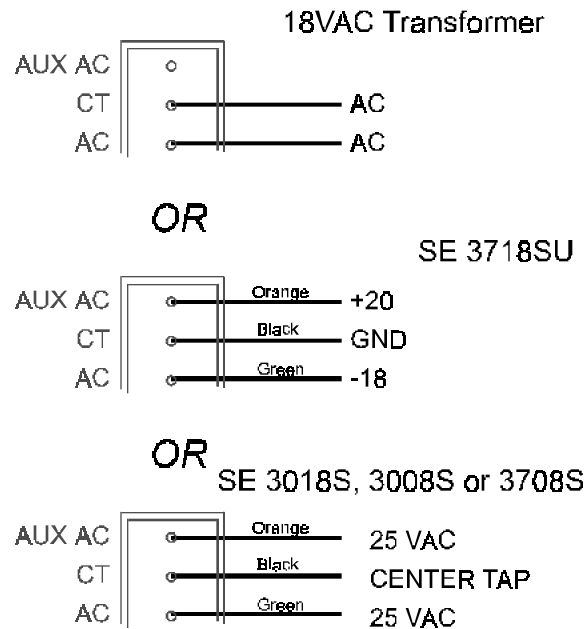
Figure 2-3: Power Connections

Battery input fuses, F1 and F2, and should be checked periodically. Replace bad fuses with 1-amp fuses only. The CI-8 does not charge the batteries; an external battery charger must be used and the charge level checked periodically.

Failure to follow the battery connection instructions below can result in a blown fuse.

1. Connect the first battery's negative terminal to the BATT- terminal of the CI-8, and connect the battery's positive terminal to the COMM terminal of the CI-8.

2. Connect the second battery's negative terminal to the COMM terminal of the CI-8, and the battery's positive terminal to the BATT+ terminal of the CI-8.
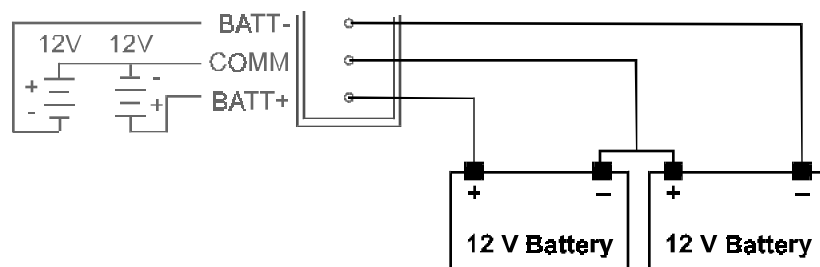

Figure 2-4: Battery Connection

COMMUNICATIONS INSTALLATION

The following general rules apply to all communication cables, 20mA loop and RS-232.

1. Plastic cable clamps and tie-wraps are acceptable. Staples must never be used to secure communication cables.

2. Communication cables from two or more CI-8 ports may be bundled together and may share a common conduit run; however, bundling or sharing conduit runs with cables of other electrical or electronic devices must be avoided. Bundling should be loose. Refer to local electrical codes for permitted conduit sizes.

3. Avoid splicing communication cables. If splicing is necessary, try to maintain as much 'twist' as possible in the twisted pairs. Protect the splice with shrink tubing to avoid shorts and ground faults.

CI-8 20 mA LOOP TO ACU CONNECTION

The 20mA loop connections are made with dual twisted-pair cable. The cable wire must be a minimum of 24-gauge and unshielded. The maximum distance between the CI-8 and an ACU is 2000 ft (610 m).

Figure 2-5 shows a single ACU connected to a 20mA port on the CI-8. Each CI-8 20 mA port can support a maximum of four ACUs; wiring for multiple ACUs is shown in Figure 2-6.
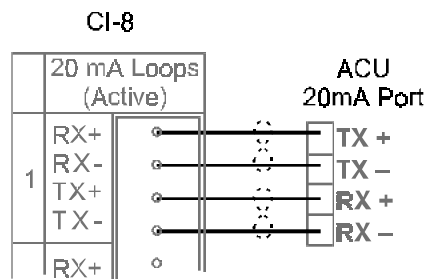

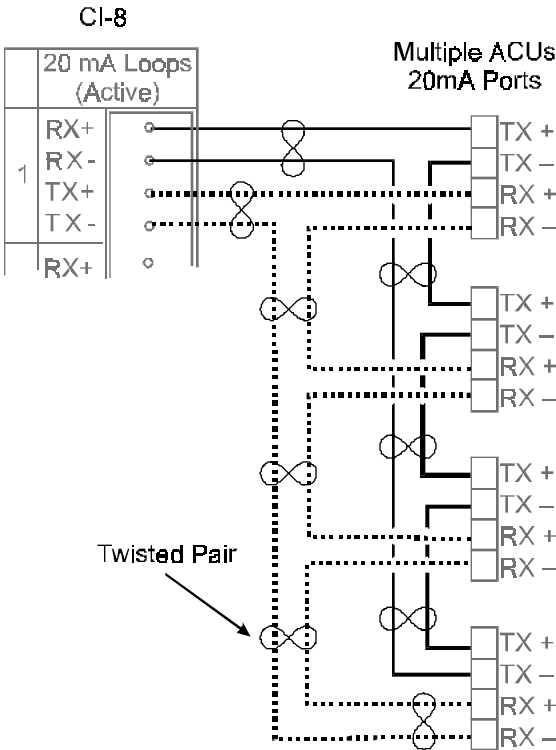**Figure 2-5: Single ACU 20mA Loop Connection**

Figure 2-6: Multiple ACUs on a CI-8 20mA Port

All the 20mA Loop switches on the CI-8 must be set appropriately for correct operation. Set to *Normal* when one or more ACUs is connected to a port. Set a switch to *Shunted* if no ACU is connected to the corresponding 20mA port. See Figure 2-7.

Figure 2-7: 20mA Loop Enable Switches

CI-8 RS-232C TO ACU CONNECTION

A null modem cable is used to connect the CI-8 to an ACU using RS-232C ports. Wires in the cable are 22-gauge, stranded core. The maximum distance between an ACU and the CI-8 is 25 ft (8 m).   Figure 2-8 shows the minimum wire connections required between the CI-8 and either a 25-pin or 9-pin ACU host port.

The AC power to all RS-232C devices must have a common ground to prevent ground potential differences. Such differences can cause loss of data.
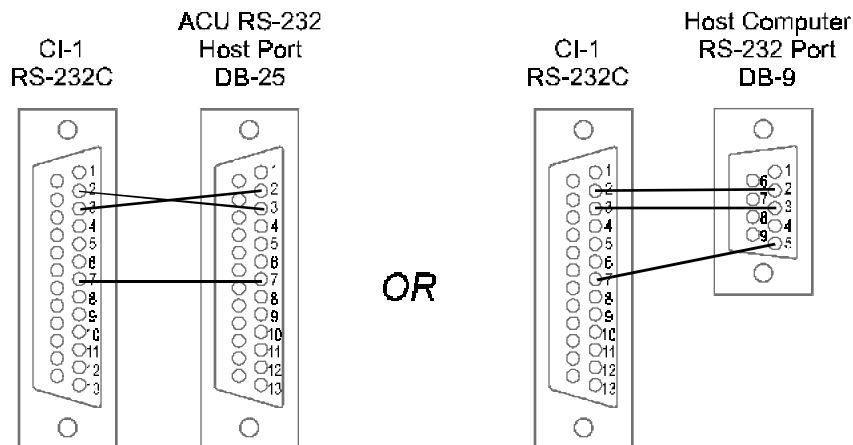
Figure 2-8: CI-8 RS-232 Connection

CI-8 TO HOST COMPUTER CONNECTION

Connection between the CI-8 and a host computer is made through RS-232 ports. Cable type, maximum length and wiring are identical to that described for the RS-232 ACU connection above. (For a 25-pin host connection use the wiring on the left of Figure 2-8; for a 9-pin host, use the wiring on the right.) All RS-232 devices including the host computer, must have a common ground to avoid faults.

TROUBLESHOOTING

This section provides troubleshooting procedures for the CI-8

If there is poor or no communication between the host system and one or more ACUs, do the following:

1. Check the 20mA Loop switches. Set a switch to *Normal* if an ACU is connected to the corresponding 20mA port. Set to *Shunted* if there is no ACU connected to the corresponding 20mA port.

2. Check that the correct wire type has been used for the 20mA loop connections. Check for correct wiring; TX- and TX+ should use one twisted pair, RX- and RX+ should use the other twisted pair. See Figures 2-5 and 2-6.

3. Check connections from the CI-8 to the ACUs.

4. Check connection between the CI-8 and the power supply or transformer.

5. Check that the baud rates of the host computer and each ACU are the same. Check the port assignment on the host system. See the appropriate host and ACU manuals.

6. Make sure that a null modem cable is used for all RS-232 connections.

7. Perform a loopback using a known good cable between the host and the CI-8. Place a jumper between pins 2 and 3 on an RS-232 port. With the host operating in the terminal mode, type ABC. The character string ABC should loop back and be displayed on the screen if the CI-8 is operating correctly. If this test fails, contact WSE Customer Support.

8. Check all fuses.

9. Check all components for damage or burn marks.

If the above checks do not resolve the problem, refer to Table 2-1.

Table 2-1: CI-8 Troubleshooting

Symptom	Action
Poor or no communication.	Measure the voltage between the CT and AC terminals on the CI-8. If it is not between 16 and 20 V, replace the power supply. (The 3708 provides 400hz, square wave power which may not be correctly read by some voltmeters.) Disconnect the ACU using 20 mA port 1. Measure the voltage between TX+ and TX- on port 1 of the CI-8. If it is not 24 VDC, go to step 6 below; if it is 24 VDC, go to step 1.
Works with AC but not with battery.	Go to step 4 below.
Blows fuses; works with AC.	Go to step 5 below.
Works with battery but not with AC.	Go to step 6 below.

1. DC present between RX+ and RX- but no communication:

    A.. Connect an ACU to one of the RS-232C ports and another ACU to one of the 20 mA ports. Leave the host system connected. Set the switches, baud rates and port assignments as required for communication.

    B. Check for communication with each of the ACUs.

    C. If there is no communication with either RS-232C or 20 mA, go to step 2.

    D. If the CI-8 communicates on RS-232C but not on 20 mA, go to step 3.

    E. If the CI-8 communicates on 20 mA but not on RS-232C, go to step 6.

2. Set all 20 mA switches to *Shunted*. Recheck communication on the ACU connected to an RS-232C port. If it is communicating, go to step 4. If it is not communicating, go to step 6.

3. Check for communication on each of the eight 20 mA ports by connecting an ACU to each one in turn and selecting only that port. If a port is not communicating, go to step 6.

4. Check the battery voltages which should be a minimum of 12VDC. Go to step 6.

5. Check the battery connections, then check battery voltages (should be less than 13.5 VDC). Go to step 6.

6. If problem cannot be resolved, contact WSE Customer Support.